

PATENT SPECIFICATION

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(54) PROCESS FOR IMPROVING THE COLOUR STABILITY OF FRESH MEAT

(71) We, AN FORAS TALUNTAIS, a Statutory Body Corporate under The Agriculture (An Foras Taluntais) Act, 1958, of 19, Sandymount Avenue, Dublin 4, Republic of Ireland, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

The present invention relates to a process for improving the colour stability of fresh meat, particularly fresh meat which is to be sold as prepackaged individual cuts such as fillet steak or sirloin steak.

There is an increasing demand for cuts of meat to be supplied in prepackaged form from food processing plants to retail outlets. However, consumers expect fresh meat to have a bright red colour and the shelf life of prepackaged meat is limited by lack of stability in this colour.

The purple colour of freshly cut meat, and meat packaged in the absence of air is due to the muscle pigment myoglobin which exists in the reduced state under anaerobic conditions. When meat is exposed to air, myoglobin rapidly combines with oxygen to form bright red oxy-myoglobin at the surface, giving cut meat its typical attractive red appearance. In order to maintain the bright red colour of fresh meat it is necessary to supply oxygen continuously to the meat surface and it is usual to package cuts of meat in permeable film which admits air. Continuous exposure of meat to oxygen, however, gradually leads to oxidation of the myoglobin pigment. The resulting metmyoglobin is brown in colour and its formation at the surface causes discolouration of the meat. Oxidation occurs most rapidly when the concentration of oxygen is low.

Consumers associate the bright red co-

lour of the meat with freshness and tend to assume that meat which has been exposed for long enough to lose its red colour has also suffered bacterial deterioration. However, if animals are slaughtered under bacteriologically clean conditions and the meat is carefully prepared and cut and then stored close to freezing point, bacterial contamination of the meat can be reduced to a minimum. This means that the meat can have a fairly long shelf life without bacterial decomposition setting in. It is desirable, therefore, to be able to improve the colour stability of the meat so that it retains its bright colour for an equally long period.

The present invention provides a process for improving the colour stability of fresh meat which comprises introducing a massive dose of ascorbic acid or a salt thereof (i.e. a dose in the range 0.15 g to 1.5 g. per Kg liveweight of the animal) into the vascular system of a living animal, holding the animal for a time sufficient to attain distribution of the ascorbic acid or salt thereof throughout the muscle tissues, and then slaughtering the animal under bacteriologically clean conditions. The conditions should be as close to sterile conditions as commercial slaughter and meat processing practices will permit.

The dose of ascorbic acid or salt thereof will vary depending on the size of the animal but preferably, the dose is within the range 0.25 to 1.25 g. per Kg. liveweight. The time for which the animal is held before slaughtering will be comparable to the holding time used when tenderising enzymes are introduced into the vascular system in accordance with known techniques. For example, a time within the range from 1 minute up to 1 hour may be suitable.

Ascorbic acid (vitamin C) is acceptable for human consumption and indeed it is 90

*ascorbic acid for colour stability
+
health benefit*

widely recommended for health reasons. The presence of residual ascorbic acid or ascorbate salts in cuts of meat is therefore unlikely to create a health hazard and indeed it may provide a benefit. If a dose of 250 gm. of sodium ascorbate is administered and distributed throughout the animal, the concentration of ascorbate in the muscle tissue is of the order of 50 parts per million.

EXAMPLE

In one series of tests on cattle of average liveweight of 350 Kg. each, 500 ml. of 50% w/v solution of sodium ascorbate in saline (i.e. a dose of 250 gm. of sodium ascorbate) was injected into the jugular vein of each test animal. For comparison, 500 ml of a 10% w/v solution of sodium ascorbate in saline (i.e. a dose of 50 gm. of sodium ascorbate) was injected into other animals. The animals were slaughtered under sterile conditions and samples of fillet steak and sirloin steak were obtained from each animal. The fillet muscle (m. psoas) and sirloin muscle (m. gluteus medius) are particularly prone to discolouration as a result of oxidation of oxy-myoglobin.

The samples were packaged and compared with control samples from untreated animals. The control samples from animals treated with the 50 g dose all discoloured more rapidly at any given storage temperature than samples from animals treated with the 250 g dose. For example, at 5°C, samples from animals treated with 250 g dose retained their red colour for 6-7 days whereas other samples were discoloured within two days.

There have previously been proposals to apply small amounts of ascorbic acid and

ascorbate salts alone or in conjunction with other compounds to the surface of fresh meat cuts for improving the colour stability of the fresh meat but it has not hitherto been suggested that ascorbic acid or ascorbate salts alone could be successfully administered in massive doses prior to slaughter for this purpose.

WHAT WE CLAIM IS:

1. A process for improving the colour stability of meat which comprises introducing into the vascular system of a living animal a dose of ascorbic acid or a salt thereof in the range of 0.15 g. to 1.5 g. per Kg. liveweight of the animal, holding the animal for a time sufficient to attain distribution of the ascorbic acid or salt thereof through the muscle tissues of the animal, and then slaughtering the animal under bacteriologically clean conditions.

2. A process according to Claim 1, wherein the dose of ascorbic acid or salt thereof is in the range 0.25 g. to 1.25 g. per Kg. liveweight of the animal.

3. A process according to any one of the preceding claims wherein the holding time is within the range 1 to 60 minutes.

4. A process according to any one of the preceding claims wherein the ascorbic acid or salt thereof is sodium ascorbate.

5. A process according to Claim 4, wherein the sodium ascorbate is administered in a saline solution.

6. A process substantially as hereinbefore described with reference to the Example.

7. Meat whenever treated by the process claimed in any of Claims 1 to 6.

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